

# **Memorandum**

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(EPA, Region 8)

From: Lynn Woodbury, Erin Formanek

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Subject: 2010 Outdoor ABS Supplemental Analysis Recommendations, Libby

Asbestos Superfund Site, Operable Unit 4

# INTRODUCTION AND PURPOSE

As noted in an earlier memorandum dated October 3, 2012, there are several residential activity-based sampling (ABS) studies that have been conducted for Operable Unit 4 (OU4) of the Libby Asbestos Superfund Site that will form the basis of the OU4 human health risk assessment (HHRA). Prior to 2011, ABS studies were designed to meet analytical requirements based on the inhalation unit risk (IUR) for asbestos provided in the Asbestos Framework document (EPA 2008). More recently, EPA has proposed new cancer and non-cancer toxicity values that are specific to LA<sup>1</sup>. These are draft values that are currently undergoing review. Because the proposed LA-specific non-cancer reference concentration (RfC) is very low, the target analytical sensitivity (TAS) requirements will be much lower to support reliable risk calculations than those originally specified in earlier (pre-2011) ABS studies.

As discussed in the Libby Risk Assessment meeting on October 23, 2012, supplemental analysis of the 2010 ABS samples (EPA 2010) is necessary to achieve lower analytical sensitivities to support reliable risk management decision-making. The purpose of this memorandum is to identify the samples selected for supplemental analysis and specify the analytic requirements for the supplemental analysis.

## **DETERMINATION OF REVISED ANALYTICAL REQUIREMENTS**

The earlier memorandum (October 3, 2012) demonstrated that the total number of grid openings (GOs) that would need to be examined as part of a supplemental analysis effort in light of the draft LA-specific RfC would be substantial. This memorandum also demonstrated that it is possible to reduce analytical costs while still limiting analytical uncertainties by analyzing samples to an "alternate" TAS, which is set higher than the TAS derived based on the draft LA-specific RfC.

http://www.epa.gov/region8/superfund/libby/2 ToxicityRiskAssessment 20110503.pdf

As discussed in the Libby Risk Assessment meeting on October 23, 2012, in order to limit analytic costs, the initial supplemental analysis will be performed using an alternate TAS. Because it is anticipated that the draft LA-specific RfC may be increased, it was agreed during the meeting that the alternate TAS would be derived based on an assumed RfC of 0.00008 structures per cubic centimeter (s/cc) (i.e., increasing the existing RfC by a factor of 4). Alternate TAS values, derived based on this assumed RfC, were calculated for each scenario as specified in Attachment 1. The following table specifies the TAS for each scenario:

2010 ABS Scenario	Alternate TAS (cc <sup>-1</sup> )	Estimated Mean Number of Additional GOs Needed per Sample to Achieve TAS
1: Residential yards	0.00050	~180
2: Residential gardens	0.0010	~80
3: Residential driveways	0.0033	~5
4: Driving on roads	0.00033	~45
5: Bike riding (adult)	0.0022	~30
5: Bike riding (trailer)	0.013	0

# **DATASET SUMMARY AND SELECTIONS**

Because the supplemental evaluation for several scenarios will require a large analytical effort, initially, only a subset of the samples collected as part of the 2010 ABS investigation will be selected for supplemental analysis. The following subsections identify which samples have been selected for supplemental analysis for each scenario.

# Scenario 1: Residential Yards

This scenario included three disturbance activities of residential yard soil that were considered to be realistic examples of relatively vigorous disturbances – raking the lawn or yard with a metal-tined leaf rake, digging in the soil with a shovel, and mowing the yard with a gasoline powered rotary lawn mower. For this scenario, four different categories of residential properties were evaluated:

- Category 1 no clean-up required, with Bin B1 in yard<sup>2</sup>
- Category 2 clean-up complete; no visible vermiculite (Vis -) in yard
- Category 3 clean-up complete; with visible vermiculite (Vis +) in yard
- Category 4 clean-up still required, with Bin B2 or Bin C in yard

A total of ten properties were evaluated for each category, and three ABS events were conducted at each property.

Due to the high level of effort associated with the supplemental analysis for this scenario (i.e., on average, about 250 additional grid openings per ABS air sample would need to be examined to achieve the alternate TAS), initially, only ABS air samples from Category 4 properties will be included in the

<sup>&</sup>lt;sup>2</sup> Bin results based on the Libby-specific polarized light microscopy method using visual area estimation (PLM-VE).

supplemental analysis. However, it is expected that supplemental analysis of the other categories will be warranted in the future. Thus, a total of 30 samples were selected for Scenario 1. **Table 1** summarizes the Scenario 1 samples selected for supplemental analysis.

# Scenario 2: Residential Gardens

This scenario included an evaluation of disturbance activities in residential garden soil. For this scenario, two different categories of residential properties were evaluated – gardens with visible vermiculite (Vis +) and gardens without visible vermiculite (Vis -). A total of ten properties were evaluated for each category, and three ABS events were conducted at each property.

ABS air samples from Vis + properties were selected for supplemental analysis as part of the initial evaluation. This is because the Vis + properties are expected to have higher LA air concentrations than the Vis - properties. Thus, a total of 30 samples were selected for Scenario 2. **Table 2** summarizes the Scenario 2 samples selected for supplemental analysis. Whether or not a supplemental evaluation is necessary for the Vis - properties will depend upon the proximity of measured LA air concentrations at Vis + properties to a decision threshold.

# Scenario 3: Driveway

This scenario included an evaluation of disturbance activities that may occur on a gravel or dirt driveway, such as riding bicycles, playing with toys, playing basketball, etc. For this scenario, two different categories of residential properties were evaluated – driveways with visible vermiculite (Vis +) and driveways without visible vermiculite (Vis -). A total of ten properties were evaluated for each category, and three ABS events were conducted at each property.

Upon review of this dataset, for most ABS air samples, only 5 additional GOs per ABS air sample would need to be examined to achieve the alternate TAS. Because of the limited number of additional GOs needed, and because the level of effort to locate and obtain the archived ABS filters is not inconsequential, for the purposes of this initial evaluation, no Scenario 3 ABS air samples were selected for supplemental analysis. Whether a supplemental evaluation is warranted in the future for Scenario 3 ABS air samples will depend upon the value identified as the final RfC.

# Scenario 4: Driving on Roads in Libby

This scenario evaluated potential exposures from driving in a car on roads and alleys (both paved and unpaved) in the town of Libby. A total of 20 driving events were conducted.

All ABS air samples from this scenario were selected for supplemental analysis as part of the initial evaluation. Thus, a total of 20 samples were selected for Scenario 4. **Table 3** summarizes the Scenario 4 samples selected for supplemental analysis.

# Scenario 5: Riding Bicycles in Libby

This scenario evaluated exposures from riding bicycles on roads and trails in Libby. This scenario included the collection of ABS air samples representative of both adult bicycle riders and children in attached bicycle trailers. A total of 10 bicycling events were conducted in each of three sectors within the city of Libby. During each event, two adult riders performed the activity (one of the bicycles had the

attached trailer), with the riders switching leading/following position periodically throughout the activity.

Upon review of this dataset, for the ABS air samples collected within the attached trailer, no additional GOs would need to be examined to achieve the alternate TAS. Therefore, no trailer ABS air samples were selected for supplemental analysis as part of the initial evaluation. Whether a supplemental evaluation is warranted in the future for the trailer ABS air samples will depend upon the value identified as the final RfC.

All of the adult rider ABS air samples collected were selected for supplemental analysis as part of the initial evaluation. Thus, a total of 60 samples were selected for Scenario 5. **Table 4** summarizes the Scenario 5 samples selected for supplemental analysis.

# ANALYTICAL REQUIREMENTS FOR THE SUPPLEMENTAL EVALUATION

Tables 1 through 4 identify the appropriate TAS for each scenario, respectively, and summarize the expected number of additional grid openings that will need to be examined as part of the supplemental analysis evaluation.

An analytical requirements summary sheet [SUPPABSOU4-1112], which details the specific preparation and analytical requirements associated with this supplemental evaluation, will be reviewed and approved by all participating laboratories in this evaluation prior to any sample handling. A copy of the most recent version of this analytical requirements summary sheet is maintained on the Libby Lab eRoom. These requirements are specified in more detail below.

# **Grid Preparation**

For each selected sample, the laboratory may use unread, archived grids prepared during the original analysis to perform the supplemental analysis. Alternatively, the laboratory may use a portion of the archived filter to prepare new grids, using the grid preparation techniques described in Section 9.3 of International Organization for Standardization (ISO) 10312 (ISO 1995). Grids will be examined by TEM in basic accordance with the recording procedures described in ISO 10312, as modified by the most recent versions of Libby Laboratory Modifications LB-000016, LB-000029, LB-000066D, LB-000067, and LB-000085.

#### **Analysis Method**

All samples will be examined using counting protocols for recording phase contrast microscopy-equivalent (PCME) structures only (per ISO 10312 Annex E). That is, filters will be examined at a magnification of about 5,000x, and all amphibole structures (including not only LA but all other amphibole asbestos types as well) that have appropriate selective area electron diffraction (SAED) patterns and energy dispersive x-ray analysis (EDXA) spectra, and having length > 5 micrometers ( $\mu$ m), width  $\geq$  0.25  $\mu$ m, and aspect ratio  $\geq$  3:1 will be recorded on the Libby-specific TEM laboratory bench sheets and EDDs for the recording of air samples. If observed, chrysotile structures should be recorded in accordance with ISO 10312 recording procedures.

# Stopping Rules

The analyst should continue to examine grid openings until one of the following is achieved:

- The TAS is achieved (see Tables 1 4 for the scenario-specific TAS).
- 25 PCME LA structures have been observed.
- A total filter area of 10 mm<sup>2</sup> has been examined (this is approximately 1,000 grid openings).

When one of these criteria has been satisfied, complete the examination of the final grid opening and stop.

# Results Reporting

When reporting supplemental analysis results, the laboratory should utilize a new Libby-specific electronic data deliverable (EDD) spreadsheet for reporting TEM air results (i.e., new grid openings should NOT be appended to the bottom of the original EDD). In the new EDD, the laboratory sample ID should be assigned a unique ID from the original analysis or the ID should include an "S" suffix (to distinguish between the original and supplemental laboratory sample ID). On the supplemental analysis benchsheet(s), the analyst should specify that the analysis is being performed as part of a supplemental evaluation by inputting the achieved sensitivity from the original analysis in the appropriate field (see lower right corner of *Lab Sheet 1*). In addition, to avoid duplicating named grid openings in the supplemental evaluation, grid names should also include an "S" suffix (e.g., Grid A-S, Grid B-S).

# **REFERENCES**

EPA (U.S. Environmental Protection Agency). 2008. Framework for Investigating Asbestos-Contaminated Sites. Report prepared by the Asbestos Committee of the Technical Review Workgroup of the Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency. OSWER Directive #9200.0-68.

\_\_\_\_\_. 2010. Sampling and Analysis Plan, Supplemental Activity-Based Sampling, Libby Asbestos Site, Operable Unit 4. U.S. Environmental Protection Agency, Region 8. Final – June 18, 2010.

ISO (International Organization for Standardization). 1995. Ambient Air – Determination of asbestos fibers – Direct-transfer transmission electron microscopy method. ISO 10312:1995(E).

#### ATTACHMENT 1: DERIVATION OF TARGET ANALYTICAL SENSTIVITY

# Step 1: Calculation of Risk-Based Concentrations

The level of analytical sensitivity needed to ensure that analysis of ABS air samples will be adequate is derived by finding the concentration of LA in ABS air that might be of potential concern, and then ensuring that if an ABS sample were encountered that had a true concentration equal to that level of concern, it would be quantified with reasonable accuracy.

Cancer. The basic equation for calculating the risk-based concentration (RBC) for cancer is:

$$RBC_c = Risk / (TWF_c * IUR_{LA})$$

where:

 $RBC_c$  = Risk-based concentration of LA in air for cancer, as PCM or PCM-equivalent (PCME) structures per cubic centimeters of air (s/cc).

Risk = Lifetime excess risk of developing cancer (lung cancer or mesothelioma) as a consequence of site-related LA exposure. For cancer, the maximum acceptable risk is a risk management decision. For the purposes of calculating a revised TAS, a value of 1E-05 is assumed.

 $\mathsf{TWF}_\mathsf{c}$  = Time-weighting factor for cancer. The value of the TWF term ranges from zero to one, and describes the average fraction of a lifetime during which exposure occurs from the specific activity being assessed.

where:

ET = Average exposure time (hrs/day)

EF = Average exposure frequency (days/year)

ED = Exposure duration (years)

IUR<sub>LA</sub>= LA-specific lifetime inhalation unit risk (LA PCM s/cc)<sup>-1</sup>

**Non-Cancer.** The basic equation for calculating the RBC for non-cancer effects is:

$$RBC_{nc} = (HQ * RfC) / TWF_{nc}$$

where:

 $RBC_{nc}$  = Risk-based concentration of LA in air for non-cancer, as PCM or PCME s/cc.

HQ = Hazard quotient for non-cancer effects as a consequence of site-related LA exposure. For non-cancer, the maximum acceptable HQ is 1.

 $TWF_{nc}$  = Time-weighting factor for non-cancer. The value of the TWF term ranges from zero to one, and describes the average fraction of a lifetime during which exposure occurs from the specific activity being assessed. Note that the interval over which exposure duration is calculated is from age 0 to age 60. This is because the non-cancer toxicity factor is based on cumulative lifetime exposure lagged by 10 years.

TWF = ET/24 \* EF/365 \* ED/60

where:

ET = Average exposure time (hrs/day)

EF = Average exposure frequency (days/year)

ED = Exposure duration (years)

 $RfC_{LA}$ = LA-specific reference concentration (LA PCM s/cc)

# Step 2: Determining the Target Analytical Sensitivity

The lower of the  $RBC_c$  and  $RBC_{nc}$  is used to derive the TAS. The TAS is determined by dividing the RBC by the target number of structures to be observed during the analysis of a sample with a true concentration equal to the RBC:

TAS = RBC / Target Count

The target count is determined by specifying a minimum detection frequency required during the analysis of samples at the RBC. This probability of detection is given by:

Probability of detection = 1 - Poisson(0, Target Count)

For the purposes of deriving a revised TAS, the target count is set equal to 3 structures (i.e., if the sample concentration is equal to the RBC, there is a 95% probability that an analysis that achieves the TAS will observe at least 1 structure).

TABLE 1
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 1 (CATEGORY 4 PROPERTIES)

Target Analytical Sensitivity (cc)<sup>-1</sup>: 0.00050 (based on adjusted RfC of 0.00008 s/cc)

					Original	Analysis			Estimated
ABS Event	Sample Number	Sample Volume (L)	Laboratory Name	EFA (mm²)	GO Area (mm²)	F-Factor	GOs Counted	Achieved Sensitivity (cc) <sup>-1</sup>	Addt'l GOs Needed to Achieve TAS
	EX-10454	296	EMSL27	385	0.013	1	53	1.9E-03	148
	EX-10541	129	EMSL27	385	0.013	1	115	2.0E-03	345
	EX-10502	311	EMSL27	385	0.013	1	48	2.0E-03	143
	EX-10595	272	EMSL27	385	0.013	1	55	2.0E-03	163
Event 1	EX-10614	294	EMSL27	385	0.013	1	51	2.0E-03	151
Ever	EX-10601	306	EMSL27	385	0.013	1	49	2.0E-03	145
	EX-10620	294	EMSL27	385	0.013	1	51	2.0E-03	151
	EX-10647	280	EMSL27	385	0.013	1	55	1.9E-03	157
	EX-10732	240	EMSL27	385	0.013	1	62	2.0E-03	185
	EX-10741	129	EMSL27	385	0.013	1	77	3.0E-03	383
	EX-10531	135	EMSL27	385	0.013	1	110	2.0E-03	329
	EX-10865	305	EMSL27	385	0.013	1	49	2.0E-03	146
	EX-10928	300	EMSL27	385	0.013	1	50	2.0E-03	148
	EX-10776	253	EMSL27	385	0.013	1	59	2.0E-03	176
Event 2	EX-11031	301	EMSL27	385	0.013	1	50	2.0E-03	147
Evel	EX-10938	289	EMSL27	385	0.013	1	52	2.0E-03	153
	EX-10902	284	EMSL27	385	0.013	1	53	2.0E-03	156
	EX-11020	289	EMSL27	385	0.013	1	35	2.9E-03	170
	EX-10905	314	EMSL27	385	0.013	1	48	2.0E-03	141
	EX-10957	123	EMSL27	385	0.013	1	77	3.1E-03	405
	EX-11262	289	EMSL27	385	0.013	1	52	2.0E-03	153
	EX-11129	253	EMSL27	385	0.013	1	60	2.0E-03	175
	EX-11255	289	EMSL27	385	0.013	1	52	2.0E-03	153
	EX-11079	284	EMSL27	385	0.013	1	53	2.0E-03	156
nt 3	EX-11304	253	EMSL27	385	0.013	1	59	2.0E-03	176
Event 3	EX-11315	259	EMSL27	385	0.013	1	58	2.0E-03	171
-	EX-11217	284	EMSL27	385	0.013	1	53	2.0E-03	156
	EX-11237	289	EMSL22	385	0.013	1	35	2.9E-03	170
	EX-11070	289	EMSL27	385	0.013	1	52	2.0E-03	153
	EX-11178	248	EMSL27	385	0.013	1	60	2.0E-03	179

ABS = activity-based sampling

L = liters

cc = cubic centimeters

mm<sup>2</sup> = square millimeters

EFA = effective filter area GO = grid opening s/cc = structures per cubic centimeter TAS = target analytical sensitivity

TABLE 2
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 2 (VIS + PROPERTIES)

Target Analytical Sensitivity (cc)<sup>-1</sup>: 0.0010 (based on adjusted RfC of 0.00008 s/cc)

		Sample Volume (L)		Estimated					
ABS Event	Sample Number		Laboratory Name	EFA (mm²)	GO Area (mm²)	F-Factor	GOs Counted	Achieved Sensitivity (cc)-1	Addt'l GOs Needed to Achieve TAS
	EX-10626	284	EMSL27	385	0.013	1	53	2.0E-03	52
	EX-10217	129	EMSL27	385	0.013	1	77	3.0E-03	153
	EX-10457	311	EMSL27	385	0.013	1	35	2.7E-03	61
	EX-10464	306	EMSL27	385	0.013	1	36	2.7E-03	61
Event 1	EX-10252	277	EMSL27	385	0.013	1	36	3.0E-03	71
Eve	EX-10236	290	EMSL27	385	0.013	1	35	2.9E-03	68
	EX-10631	284	EMSL27	385	0.013	1	53	2.0E-03	52
	EX-10645	290	EMSL27	385	0.013	1	52	2.0E-03	51
	EX-10679	294	EMSL27	385	0.013	1	34	3.0E-03	67
	EX-10674	289	EMSL27	385	0.013	1	35	2.9E-03	68
	EX-10988	253	EMSL27	385	0.013	1	40	2.9E-03	78
	EX-10598	135	EMSL27	385	0.013	1	74	3.0E-03	146
	EX-10688	285	EMSL27	385	0.013	1	35	3.0E-03	69
	EX-10784	259	EMSL27	385	0.013	1	58	2.0E-03	57
nt 2	EX-10655	301	EMSL27	385	0.013	1	33	3.0E-03	66
Event 2	EX-10585	127	EMSL27	360	0.013	0.25	77	1.1E-02	796
	EX-10941	289	EMSL27	385	0.013	1	35	2.9E-03	68
	EX-11016	289	EMSL27	385	0.013	1	35	2.9E-03	68
	EX-11038	295	EMSL27	385	0.013	1	34	3.0E-03	67
	EX-10976	263	EMSL27	360	0.013	0.25	77	5.5E-03	345
	EX-11145	257	EMSL22	385	0.013	1	39	3.0E-03	77
	EX-11092	246	EMSL27	385	0.013	1	31	3.9E-03	90
	EX-11100	253	EMSL27	385	0.013	1	30	3.9E-03	88
	EX-11294	129	EMSL27	385	0.013	1	77	3.0E-03	153
nt 3	EX-11240	289	EMSL22	385	0.013	1	35	2.9E-03	68
Event 3	EX-11133	253	EMSL27	385	0.013	1	40	2.9E-03	78
	EX-11046	284	EMSL27	385	0.013	1	35	3.0E-03	70
	EX-11233	289	EMSL22	385	0.013	1	35	2.9E-03	68
	EX-11202	289	EMSL22	385	0.013	1	35	2.9E-03	68
	EX-11269	121	EMSL27	385	0.013	1	77	3.2E-03	168

ABS = activity-based sampling

cc = cubic centimeters

EFA = effective filter area GO = grid opening L = liters

mm<sup>2</sup> = square millimeters

s/cc = structures per cubic centimeter

TAS = target analytical sensitivity

TABLE 3
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 4 (ALL SAMPLES)

Target Analytical Sensitivity (cc)<sup>-1</sup>: 0.00033 (based on adjusted RfC of 0.00008 s/cc)

	Sample Number			Estimated					
ABS Event		Sample Volume (L)	Laboratory Name	EFA (mm²)	GO Area (mm²)	F-Factor	GOs Counted	Achieved Sensitivity (cc) <sup>-1</sup>	Addt'l GOs Needed to Achieve TAS
1	EX-10017	1415	EMSL27	385	0.013	1	21	1.0E-03	42
2	EX-10022	1435	EMSL27	385	0.013	1	21	9.8E-04	41
3	EX-10026	1457	EMSL27	385	0.013	1	21	9.7E-04	40
4	EX-10031	1444	EMSL27	385	0.013	1	21	9.8E-04	41
5	EX-10038	1399	EMSL27	385	0.013	1	22	9.6E-04	42
6	EX-10043	1405	EMSL27	385	0.013	1	22	9.6E-04	42
7	EX-10013	1384	EMSL27	385	0.013	1	22	9.7E-04	43
8	EX-10047	1378	EMSL27	385	0.013	1	22	9.8E-04	43
9	EX-10060	1395	EMSL27	385	0.013	1	22	9.6E-04	42
10	EX-10056	1364	EMSL27	385	0.013	1	22	9.9E-04	44
11	EX-10051	1281	EMSL27	385	0.013	1	24	9.6E-04	46
12	EX-10181	1322	EMSL27	385	0.013	1	23	9.7E-04	45
13	EX-10185	1346	EMSL27	385	0.013	1	23	9.6E-04	43
14	EX-10183	1322	EMSL27	385	0.013	1	23	9.7E-04	45
15	EX-10193	1312	EMSL27	385	0.013	1	23	9.8E-04	45
16	EX-10189	1277	EMSL27	385	0.013	1	24	9.7E-04	46
17	EX-10191	1287	EMSL27	385	0.013	1	24	9.6E-04	45
18	EX-10200	1291	EMSL27	385	0.013	1	23	1.0E-03	46
19	EX-10196	1322	EMSL27	385	0.013	1	23	9.7E-04	45
20	EX-10198	1322	EMSL27	385	0.013	1	23	9.7E-04	45

ABS = activity-based sampling cc = cubic centimeters

EFA = effective filter area

GO = grid opening

L = liters

mm<sup>2</sup> = square millimeters

s/cc = structures per cubic centimeter

TAS = target analytical sensitivity

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TABLE 4
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 5 (RIDER SAMPLES)

Target Analytical Sensitivity (cc)<sup>-1</sup>: 0.0022 (based on adjusted RfC of 0.00008 s/cc)

			Sample Volume (L)			Estimated				
Sector	Event	Sample Number		Laboratory Name	EFA (mm²)	GO Area (mm²)	F-Factor	GOs Counted	Achieved Sensitivity (cc) <sup>-1</sup>	Addt'l GOs Needed to Achieve TAS
	1	EX-10106	287	EMSL27	385	0.013	1	21	4.9E-03	26
	1	EX-10108	292	EMSL27	385	0.013	1	21	4.8E-03	25
	2	EX-10115	278	EMSL27	385	0.013	1	21	5.1E-03	27
	2	EX-10116	276	EMSL27	385	0.013	1	22	4.9E-03	27
	3	EX-10263	271	EMSL27	385	0.013	1	8	1.4E-02	42
	3	EX-10264	280	EMSL27	385	0.013	1	22	4.8E-03	26
	4	EX-10305	253	EMSL27	385	0.013	1	14	8.4E-03	39
	4	EX-10307	276	EMSL27	385	0.013	1	24	4.5E-03	25
	F	EX-10311	257	EMSL27	385	0.013	1	15	7.7E-03	37
Sector A	5	EX-10312	235	EMSL27	385	0.013	1	29	4.3E-03	28
ect		EX-10316	149	EMSL27	385	0.013	1	42	4.7E-03	48
S	6	EX-10317	263	EMSL27	385	0.013	1	25	4.5E-03	26
	7	EX-10375	261	EMSL27	385	0.013	1	24	4.7E-03	27
	7	EX-10376	271	EMSL27	385	0.013	1	25	4.4E-03	25
		EX-10381	257	EMSL27	385	0.013	1	25	4.6E-03	27
	8	EX-10383	263	EMSL27	385	0.013	1	25	4.5E-03	26
	9	EX-10385	253	EMSL27	385	0.013	1	25	4.7E-03	28
		EX-10386	270	EMSL27	385	0.013	1	25	4.4E-03	25
•	10	EX-10391	257	EMSL27	385	0.013	1	25	4.6E-03	27
		EX-10392	259	EMSL27	385	0.013	1	25	4.6E-03	27
	1	EX-10093	287	EMSL27	385	0.013	1	11	9.4E-03	36
		EX-10094	294	EMSL27	385	0.013	1	21	4.8E-03	25
	2	EX-10096	289	EMSL27	385	0.013	1	21	4.9E-03	26
		EX-10099	274	EMSL27	385	0.013	1	22	4.9E-03	27
		EX-10265	289	EMSL27	385	0.013	1	21	4.9E-03	26
	3	EX-10266	265	EMSL27	385	0.013	1	23	4.9E-03	28
•	_	EX-10275	278	EMSL27	385	0.013	1	22	4.8E-03	26
	4	EX-10276	295	EMSL27	385	0.013	1	21	4.8E-03	25
	_	EX-10280	263	EMSL27	385	0.013	1	23	4.9E-03	28
or B	5	EX-10281	283	EMSL27	385	0.013	1	21	5.0E-03	26
Sector B	_	EX-10338	248	EMSL27	385	0.013	1	24	5.0E-03	30
Ň	6	EX-10339	263	EMSL27	385	0.013	1	23	4.9E-03	28
	_	EX-10345	263	EMSL27	385	0.013	1	23	4.9E-03	28
	7	EX-10346	283	EMSL27	385	0.013	1	21	5.0E-03	26
•		EX-10348	287	EMSL27	385	0.013	1	21	4.9E-03	26
	8	EX-10350	285	EMSL27	385	0.013	1	21	4.9E-03	26
		EX-10397	276	EMSL27	385	0.013	1	25	4.3E-03	24
	9	EX-10398	319	EMSL27	385	0.013	1	21	4.4E-03	21
•		EX-10403	259	EMSL27	385	0.013	1	25	4.6E-03	27
	10	EX-10404	255	EMSL27	385	0.013	1	25	4.6E-03	28

TABLE 4
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 5 (RIDER SAMPLES)

Target Analytical Sensitivity (cc)<sup>-1</sup>: 0.0022 (based on adjusted RfC of 0.00008 s/cc)

	Event					Original	Analysis			Estimated
Sector		Sample Number	Sample Volume (L)	Laboratory Name	EFA (mm²)	GO Area (mm²)	F-Factor	GOs Counted	Achieved Sensitivity (cc) <sup>-1</sup>	Addt'l GOs Needed to Achieve TAS
	1	EX-10287	267	EMSL27	385	0.013	1	23	4.8E-03	27
	1	EX-10288	259	EMSL27	385	0.013	1	23	5.0E-03	29
	2	EX-10291	278	EMSL27	385	0.013	1	22	4.8E-03	26
	2	EX-10292	250	EMSL27	385	0.013	1	24	4.9E-03	30
	3	EX-10301	248	EMSL27	385	0.013	1	24	5.0E-03	30
	3	EX-10304	321	EMSL27	385	0.013	1	11	8.4E-03	31
	4	EX-10324	280	EMSL27	385	0.013	1	24	4.4E-03	24
		EX-10325	246	EMSL27	385	0.013	1	27	4.5E-03	28
	5	EX-10327	237	EMSL27	385	0.013	1	27	4.6E-03	30
Sector C		EX-10328	274	EMSL27	385	0.013	1	24	4.5E-03	25
ect	6	EX-10332	271	EMSL27	385	0.013	1	24	4.6E-03	26
0,	U	EX-10334	257	EMSL27	385	0.013	1	24	4.8E-03	28
	7	EX-10353	263	EMSL27	385	0.013	1	23	4.9E-03	28
		EX-10355	253	EMSL27	385	0.013	1	24	4.9E-03	29
	8	EX-10359	257	EMSL27	385	0.013	1	24	4.8E-03	28
	0	EX-10361	259	EMSL27	385	0.013	1	23	5.0E-03	29
	9	EX-10365	270	EMSL27	385	0.013	1	22	5.0E-03	28
	9	EX-10366	263	EMSL27	385	0.013	1	23	4.9E-03	28
	10	EX-10370	278	EMSL27	385	0.013	1	24	4.4E-03	24
	10	EX-10371	271	EMSL27	385	0.013	1	13	8.4E-03	37

ABS = activity-based sampling cc = cubic centimeters EFA = effective filter area GO = grid opening L = liters

mm<sup>2</sup> = square millimeters

s/cc = structures per cubic centimeter
TAS = target analytical sensitivity



# Re: 2010 Outdoor ABS Supplemental Analysis 🗎

Rebecca Thomas to: Woodbury, Lynn

11/19/2012 12:42 PM

David Berry, Deborah McKean, Donald Goodrich, Elizabeth Fagen,

"Formanek, Erin", "Smith, Nathan T."

From: Rebecca Thomas/R8/USEPA/US

To: "Woodbury, Lynn" <woodburyl@cdmsmith.com>

Cc: David Berry/R8/USEPA/US@EPA, Deborah McKean/R8/USEPA/US@EPA, Donald

Goodrich/R8/USEPA/US@EPA, Elizabeth Fagen/R8/USEPA/US@EPA, "Formanek, Erin"

<formanekek@cdmsmith.com>, "Smith, Nathan T." <SmithNT@cdmsmith.com>

Lynn & Erin - I concur with the 2010 Outdoor ABS supplemental analysis recommendations for OU4 of the Libby Asbestos Site, as described in your November 6, 2012 memorandum. Thank you.

U.S. EPA, Region 8 Rebecca Thomas (EPR-SR) 1595 Wynkoop Denver, Colorado 80202-1129 (303) 312-6552

"Woodbury, Lynn" As discussed in the last Libby Risk Assessment... 11/08/2012 11:34:07 AM

From: "Woodbury, Lynn" <woodburyl@cdmsmith.com>

To: Elizabeth Fagen/R8/USEPA/US@EPA, Rebecca Thomas/R8/USEPA/US@EPA, Deborah

McKean/R8/USEPA/US@EPA, David Berry/R8/USEPA/US@EPA

Cc: "Formanek, Erin" <formanekek@cdmsmith.com>, "Smith, Nathan T." <SmithNT@cdmsmith.com>,

Donald Goodrich/R8/USEPA/US@EPA

Date: 11/08/2012 11:34 AM

Subject: 2010 Outdoor ABS Supplemental Analysis

As discussed in the last Libby Risk Assessment meeting, supplemental analysis of the 2010 ABS samples is necessary to achieve lower analytical sensitivities to support reliable risk management decision-making. The attached memorandum identifies the samples selected for supplemental analysis and specifies the analytic requirements for the supplemental analysis.

Of note, based on the use of an "adjusted" TAS, there were a few changes in the dataset recommendations from what was discussed at the meeting. In particular, at this time, we are not recommending any supplemental analysis for the driveway ABS scenario [Scenario 3]. In addition, for the bicycle riding scenario [Scenario 5], we recommend supplemental analysis of the ABS air samples for the adult riders only and not the bicycle trailer (child).

Please let me know if you have any questions or concerns with these recommendations, Lynn

**Lynn Woodbury** | CDM Smith | 555 17th Street, Suite 1100 | Denver, CO 80202 | direct: 303.383.2382 | fax: 303.308.3003 | <u>woodburyL@cdmsmith.com</u>

[attachment "Follow-up Memo-2010 Suppl ABS\_11-6-12.pdf" deleted by Rebecca Thomas/R8/USEPA/US]